

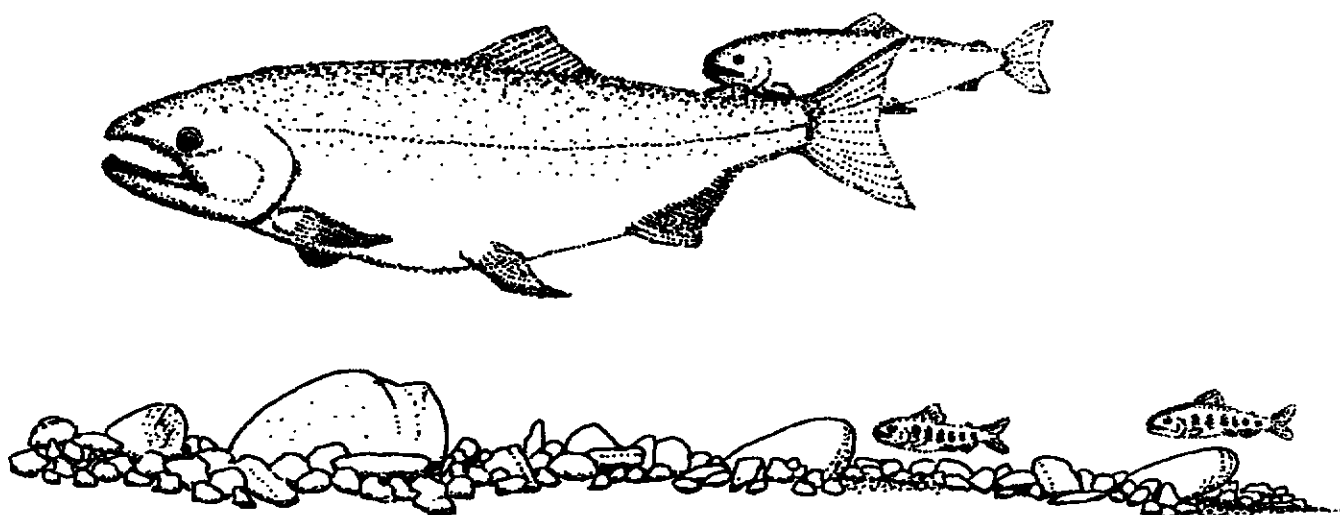
**DRAFT**



**U.S. FISH AND WILDLIFE SERVICE**

---

**PROGRESS REPORT OF NATIONAL FISH HATCHERY  
PROGRAMMING AND EVALUATION ACTIVITIES  
PUGET SOUND AND COASTAL WASHINGTON, 1990-1991**



**WESTERN WASHINGTON FISHERY RESOURCE OFFICE**

---

**OLYMPIA, WASHINGTON**

**AUGUST 1992**

PROGRESS REPORT OF NATIONAL FISH HATCHERY  
PROGRAMMING AND EVALUATION ACTIVITIES  
PUGET SOUND AND COASTAL WASHINGTON, 1990-1991

David P. Zajac

U.S. Fish and Wildlife Service  
Western Washington Fishery Resource Office  
Olympia, Washington

August 1992

## PREFACE

The purpose of this report is to provide an annual update of hatchery programming changes and evaluation activities. Although this report contains some analysis of existing data and recommends changes to programming activities, the intent is to provide periodic updates and not comprehensive analyses of the various programs. Rather, individual reports will be generated that will encompass many years of data concerning individual programs and will provide detailed analysis of the results. Those reports will normally address specific evaluations and will be generated by U.S. Fish and Wildlife Service, Western Washington Fishery Resource Office, Olympia, Washington.

# TABLE OF CONTENTS

	Page
PREFACE .....	ii
LIST OF TABLES .....	v
INTRODUCTION .....	1
QUILCENE NATIONAL FISH HATCHERY .....	1
FALL CHINOOK .....	3
Discussion/Recommendations .....	3
SPRING CHINOOK .....	3
Releases and Transfers.....	3
Terminal Area Returns, 1990 .....	3
Terminal Area Returns, 1991 .....	4
Coded Wire Tag Recoveries .....	4
Discussion/Recommendations .....	4
COHO .....	4
Releases and Transfers .....	4
Terminal Area Returns, 1990 .....	4
Coded Wire Tag Recoveries .....	4
Discussion/Recommendations .....	4
CHUM .....	5
Releases and Transfers .....	5
Terminal Area Returns, 1990 .....	5
Discussion/Recommendations .....	5
MAKAH NATIONAL FISH HATCHERY .....	5
FALL CHINOOK .....	6
Releases and Transfers .....	6
Terminal Area Returns, 1990 .....	6
Coded Wire Tag Recoveries .....	6
Discussion/Recommendations .....	6
COHO .....	7
Releases and Transfers .....	7
Terminal Area Returns, 1990 .....	7
Coded Wire Tag Recoveries .....	7
Discussion/Recommendations .....	7
CHUM .....	8
Releases .....	8
Terminal Area Returns, 1990 .....	8
Discussion/Recommendations .....	8
WINTER STEELHEAD .....	8
Releases and Transfers .....	8
Terminal Area Returns, 1990 .....	8
Mark Recoveries .....	9
Discussion/Recommendations .....	9

QUINULT NATIONAL FISH HATCHERY .....	9
FALL CHINOOK .....	9
Releases and Transfers .....	9
Terminal Area Returns, 1990 .....	10
Coded Wire Tag Recoveries .....	10
Discussion/Recommendation .....	10
COHO .....	10
Releases and Transfers .....	10
Terminal Area Returns, 1990 .....	10
Coded Wire Tag Recoveries .....	10
Discussion/Recommendation .....	11
CHUM .....	11
Releases and Transfers .....	11
Terminal Area Returns, 1990 .....	11
Discussion/Recommendation .....	11
WINTER STEELHEAD .....	11
Releases and Transfers .....	11
Terminal Area Returns, 1990 .....	11
Coded Wire Tag Recoveries .....	11
Discussion/Recommendation .....	11
ACKNOWLEDGMENTS .....	12
REFERENCES .....	12
TABLES .....	13
APPENDICES .....	24

# LIST OF TABLES

Table No.		Page
1	Quilcene National Fish Hatchery salmon releases made into Washington waters during 1991.	13
2	Spring chinook age at return to Quilcene National Fish Hatchery during 1990 (98.7% sampled).	14
3	Counts of brood-year 1991 spring chinook (all ages) in the Big Quilcene River and hatchery. Counts in the river are based on snorkel observations.	14
4	Chum age at return to Quilcene National Fish Hatchery during 1990 (33.3% sampled).	15
5	Makah National Fish Hatchery salmon and steelhead releases made into Washington waters during 1991.	16
6	Fall chinook age at return to Makah National Fish Hatchery during 1990 (98.9% sampled).	17
7	Winter steelhead age at return to Makah National Fish Hatchery during 1990 (December 12, 1999 - February 13, 1991, 98.7% sampled).	18
8	Quinault National Fish Hatchery salmon and steelhead releases made into Washington waters during 1991.	19
9	Fish and eyed egg transfers from Quinault National Fish Hatchery, 1990.	20
10	Fall chinook age at return to Quinault National Fish Hatchery 1990 (92.5% sampled).	21
11	Chum age at return to Quinault National Fish Hatchery during 1990 (19.7% sampled).	22
12	Winter steelhead age at return to Quinault National Fish Hatchery during 1990 (70.1% sampled).	23

## INTRODUCTION

This report contains information regarding August 1, 1990 to July 31, 1991 hatchery programming and evaluation activities at Makah, Quilcene, and Quinalt National Fish Hatcheries (NFH) (Figure 1). This information has been compiled using the fisheries resources evaluation database system (FRED) designed by the Western Washington Fishery Resource Office (USFWS, 1991). Much of the data collected using this system will allow extensive correlation of rearing variables to survival estimates in subsequent species-specific in-depth reports. A general summary of the various types of data routinely collected at each facility is presented in Appendix A. More detailed information may be obtained from the Western Washington Fishery Resource Office (WWFRO).

Production goals for 1990 brood at Makah, Quilcene, and Quinalt NFHs are presented in Appendix B for reference purposes.

Two actions occurred during the reporting period that involved all three facilities. First a mini-workshop concerning hatchery spawning techniques and potential impact to genetic profiles was conducted by National Fishery Research Center (Seattle). The object was to give the hatchery staffs an opportunity to question and understand current genetic philosophies as they relate to spawning guidelines. Most of the staffs from Makah, Quilcene, and Quinalt were able to attend this one-day presentation. Generally, comments concerning the presentation were positive and several people suggested an annual meeting prior to the spawning season.

Second, the fish/egg release/transfer permit process in the State of Washington has changed from the individual Washington Department of Fisheries (WDF) permit for each release/transfer to a comprehensive all releases/transfers format, called "Future Brood Document." The process requires submission of the Associate Manager approved hatchery programming document to WDF by April 1 each year. The future brood document lists the production goals for all programs in Washington State and is reviewed by all agencies. The final document is distributed by July 1 prior to the start of the spawning season. This new system is a vast improvement over the previous permit process.

## QUILCENE NATIONAL FISH HATCHERY

The Quilcene NFH program is managed under the guidance of the Hood Canal Management Plan and the Hood Canal Production Evaluation Program. However, no structured group meets on a regular basis to discuss the program. Consequently, a Technical Group was established to improve communication between concerned agencies and to coordinate Quilcene NFH program goals. Participating agencies include WDF, Point-No-Point Treaty Council (PNPTC), and the U.S. Fish and Wildlife Service (Service). Similar groups are already established for Quinalt and Makah NFHs.

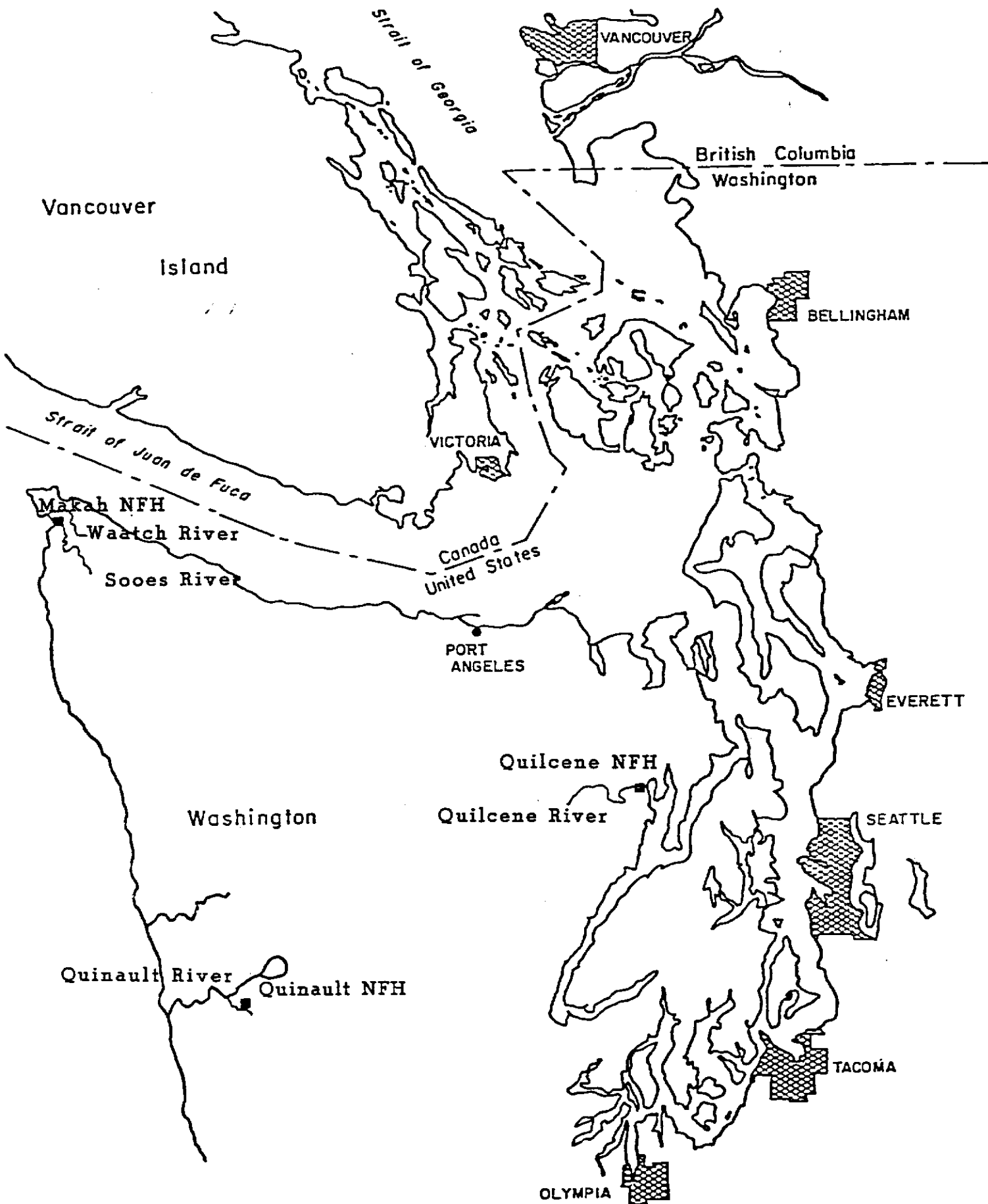


Figure 1. Location of Quilcene, Makah, and Quinault National Fish Hatcheries.



The electric weir installed in 1989 is still not working properly. Modifications and testing are scheduled for fall 1991.

Infectious Hematopoietic Necrosis (IHN) was discovered in the adult chum return. Consequently, approximately 200,000 eggs were destroyed and the Big Quilcene River is considered suspect. Off-station plants of coho fingerling into Area 12A tributaries have been suspended indefinitely as a result.

#### FALL CHINOOK

Discussion/Recommendations This year 54,000 fry were transferred to Quilcene from George Adams Hatchery (WDF) in March 1991 for temporary rearing. The resulting 51,000 fingerlings were transferred back to George Adams Hatchery in June for final rearing and release. We should continue this program as space allows.

#### SPRING CHINOOK

Restoration of Puget Sound spring chinook continues to be a high Service priority. Working with state and tribal agencies, our goal is to restore spring chinook salmon to the Skokomish River. Development of a spring chinook brood run at Quilcene NFH is an important part of this restoration effort. Problems with low survival still exist however, (Hiss et al, 1988). An important step was made through development of the Hood Canal Production Evaluation Program (HCPEP), which includes a 6-year evaluation of spring chinook at Hood Canal facilities (Point No Point, et.al., 1989). This proposal was developed by PNPTC, Service, and WDF, and documents temporary production deviations from the Hood Canal Salmon Management Plan. The most important change at Quilcene is addition of Soleduck spring chinook and the transfer of some Quilcene spring chinook to Hood Canal Hatchery. Soleduck spring chinook will also be reared along with Quilcene spring chinook at Hood Canal Hatchery. This combination will allow a comparison of relative success of rearing and release strategies of the two stocks at two locations.

Releases and Transfers: The hatchery released 67,134 yearlings (Quilcene stock) at 10.0 fish/pound, and 161,945 yearlings (Soleduck stock) at 8.0 fish/pound on May 13, 1991 (Table 1) and transferred 17,400 fingerlings (Quilcene stock) to Hoodsport Hatchery on May 10, 1991 to meet our commitment to the HCPEP. All fish released were coded wire tagged to accommodate our commitment to the Pacific Salmon Treaty, the HCPEP stock and release location comparison, antibiotic test to control bacterial kidney disease (BKD), and size at release comparisons. Each raceway of spring chinook was tagged with a unique code to accommodate all of these evaluations. Specific tagging information is presented in Appendix C.

Terminal Area Returns, 1990: A return of 64 males and 13 females was recorded at the hatchery during 1990. Five of these fish were removed from the river during broodstock capture operations on August 14, 1990. Bio-sampling was conducted on 98.7% of the run. Resulting age structure and length information are presented in Table 2. The run fell far short of our escapement requirement of 500.

Terminal Area Returns, 1991: During the spring and summer of 1991 we monitored returning adults in the Big Quilcene River by conducting snorkel surveys (Table 3). Our objectives were to estimate abundance, determine timing, document poaching, and determine possible broodstock collection sites. The first survey on April 26 showed 4 spring chinook in the river. Approximately half the return had entered the system by mid-June with some fish showing poaching wounds.

Coded Wire Tag Recoveries: All returning hatchery fish were sampled for coded wire tags. Fifty-six tags were recovered, representing 11 different codes, all originating from Quilcene releases. In addition to hatchery recoveries, Quilcene spring chinook were caught in Puget Sound sport, Washington ocean troll, and Canadian net, sport, and troll fisheries.

Discussion/Recommendations: Four days after release, divers observed many yearlings remaining in the river. More than a week later an estimated 21,000 fish (9% of the release) still remained. Subsequent sampling showed higher condition factors for fish remaining in the river when compared to pre-release sampling done in the hatchery. Generally, as salmon near smoltification condition factor drops (Kane 1992). A snorkel survey conducted one month later showed the fish had left. Monitoring of the release and condition factor sampling will continue next year.

The current program will remain unchanged including evaluations concerning antibiotic treatments, stock comparisons, and release size.

#### COHO

Releases and Transfers: Coho production at Quilcene NFH included 352,556 yearlings and 948,289 fry released on-station. 113,032 fry planted upstream of the hatchery (Table 1), 50,000 eyed eggs transferred to Chimacum High School, and 105,000 eyed eggs transferred to U.S. Navy SUBASE Bangor. A portion of the yearling release was coded wire tagged to update our knowledge of distribution and survival. Specific tagging information is presented in Appendix C.

Terminal Area Returns, 1990: Coho returns provided sufficient spawners to meet program needs for 1990. Escapement to the hatchery was 3,866 fish. Estimated harvest of Quilcene coho in area 12A net fisheries was 5,500, 1,500 in Big Quilcene River net fisheries, and 200 in the Big Quilcene River sport fisheries.

Coded Wire Tag Recoveries: All returning hatchery fish were sampled for coded wire tags. Three hundred and twenty seven tags were recovered, representing seven different codes, five originating from Quilcene releases and one each from pen releases in Quilcene and Port Gamble Bays. In addition to hatchery recoveries, Quilcene coho were caught in most Canadian and Washington fisheries and also a few in Oregon as well.

Discussion/Recommendations: This year we initiated fry releases above the hatchery in lieu of adult passage. This arrangement requires much less manpower and reduces the potential for pathogen spread from infected adults.

We will continue to coordinate adjustments to yearling coho production with the Steering Committee depending on spring chinook space requirements.

Recent tag recoveries at the rack show returns of a few Dungeness stock coho originally released from Quilcene and Port Gamble Bay pen operations. Continued sampling will indicate whether this will occur annually. If so, we will discuss potential damage to the Quilcene stock genetic profile from inadvertently using Dungeness stock in the spawning operation.

#### CHUM

Releases and Transfers: A total of 1,664,227 chum fry was released at Quilcene NFH (Table 1) consisting of Quilcene and Enetai stocks. Approximately 350,000 of these resulted from an egg transfer from Enetai to Quilcene NFH.

Terminal Area Returns, 1990: Records show a return of 782 males and 842 females to Quilcene. Bio-sampling was conducted on 33.3% of the return. Scale analysis showed age four predominated at 91.9% (Table 4). In addition, many fish remained in the river and spawned naturally. The Quilcene program also contributed to Puget Sound fisheries. Run reconstruction estimates indicate approximately 5,600 Quilcene chum were caught in the commercial fisheries and 200 in the Big Quilcene River sport fisheries.

Discussion/Recommendations: IHN was isolated from adults spawned on December 18, 1990. Consequently, about 200,000 eggs from this take were destroyed.

Walcott was not operated this year since releases were discontinued in 1986 and no returns were expected. The current lease agreement requires use of trap at lease once in every four years. Therefore, we will operate the trap occasionally to maintain our lease. While no return was expected to Walcott Slough, a foot survey was conducted on December 18 to identify naturally spawning fish. Approximately 45 carcasses were counted along with numerous redds. Regardless of our discontinued operation at Walcott, it appears limited natural production will occur.

Coded wire tagging has not been done with chum at Quilcene because marine area sampling for tags is not done. However, Genetic Stock Identification (GSI) is continuing to be developed. Perhaps a reasonable evaluation may be possible using run reconstruction estimates, catch records, escapement data, and GSI. The feasibility of performing such an evaluation in the future should be considered.

#### MAKAH NATIONAL FISH HATCHERY

Restoration of coastal stocks of salmon and steelhead is a high Service priority. Makah NFH coho and steelhead programs are successful and the chinook program appears to be improving. However, a major setback was experienced when routine coho broodstock disease sampling performed by Olympia Fish Health Center (OFHC) on February 17, 1989, resulted in the discovery of viral hemorrhagic septicemia (VHS), heretofore never found in North America.

Through a series of meetings between state, federal, and tribal agencies, fish health protection groups, and consultation with European experts, it was decided to destroy all stocks of fish on February 23, 1989 and to chlorinate the hatchery by June 13, 1989. Consequently, returns of adult coho and steelhead and age two fall chinook were expected to be minimal or non-existent in 1990.

#### FALL CHINOOK

The fall chinook program remains the highest priority at Makah NFH. Return numbers have continued to improve and the Makah Tribe has continued its support of the program by not allowing a directed fishery on the run in 1990. However, all brood-year 1988 progeny were destroyed to control the spread of VHS. No replacement stocks were located. Consequently, the run building process will be slowed and significant gaps will exist in the adult cycles for many years until overlapping ages fill in.

Releases and Transfers: 384,136 subyearling fall chinook were released on-station (Table 5). In addition, 50,000 fry were released for mitigation above Makah NFH. We continue to coded wire tag the on-station release for evaluation purposes and because it is identified as a major production program for the Pacific Salmon Treaty. Specific tagging information is presented in Appendix D.

Terminal Area Returns, 1990: The hatchery return totalled 288 fish. Bio-sampling of 98.9% of the fish indicated returning males were predominately three-year-olds and females were predominately four-year-olds (Table 6). The lack of two-year-old males observed was expected since the 1988 brood was destroyed.

Coded Wire Tag Recoveries: All returning hatchery fish were sampled for coded wire tags, resulting in 55 tags, representing 8 different codes. These recoveries included one fish originally released at Hoko Pond. In addition to hatchery recoveries, Makah fall chinook were caught in Alaska troll and net, Canadian troll and net, and Washington treaty troll fisheries.

Discussion/Recommendations: Although one entire brood was destroyed because of VHS, we should maintain the native stock integrity by allowing the immediate gap in the adult cycle to recover naturally with returning multiple age classes. To supplement this native stock with a foreign stock could jeopardize our run rebuilding efforts.

The 1990 return yielded less than one-half million eggs. Coupled with the total loss of 1988 brood due to VHS the run-building process will be slowed. Consequently, the usual upstream release of 120,000 fish was reduced to 50,000 for one year.

We have initiated a two-stage release strategy beginning with the 1991 release. Approximately half of production is released as normal towards the end of May at about 70/lb. The remainder are released later in June at a larger size. Programs on the Columbia River and at Quinault NFH have realized increased survival by releasing fall chinook later and larger. We hope to

realize the same result and thereby improve our chances at run rebuilding. Both releases will be tagged for evaluation purposes.

We proposed a production goal increase to 5,000,000 based on capacity available during chum shortfalls. The proposal was accepted by the Makah Tribal Fisheries Management. However, production at that level is not expected for several years.

Since fall chinook continues to be the priority program at this facility, evaluation of production releases should continue. We also have a commitment to coded wire tag this stock as a US/Canada indicator stock. Directed terminal fisheries should not occur on chinook and incidental catch of chinook during coho fisheries should be monitored closely to prevent significant impact on the return.

### COHO

Although broodyear 1987 subyearlings and broodyear 1988 eggs and fry were destroyed because of VHS, replacement stock for broodyear 88 was transferred from Quinalt NFH. Considerable discussion occurred between steering committee members and National Fishery Research Center (Seattle) concerning appropriate replacement stocks. Quinalt stock was selected because it is an abundant coastal stock and has been transferred to Makah in the past to supplement shortages.

Releases and Transfers: Coho production included 305,600 yearlings released on-station, 250,000 mitigation fry released upstream of the hatchery, and 62,500 fingerlings released into Waatch River (Table 5). Also, 60,911 yearlings were transferred to Educk Creek hatchery on March 5, 1991 for imprint and release. This transfer group was coded wire tagged also. Yearling releases were coded wire tagged to continue our assessment of total survival. Specific tagging information is presented in Appendix D.

Terminal Area Returns, 1990: Only 65 adult coho returned to the hatchery during 1990. However, production needs were met by transferring 1990 brood eggs from Quinalt to Makah.

The river net fishery did not operate this year.

Coded Wire Tag Recoveries: All returning hatchery fish were sampled for coded wire tags. However, no tags were recovered.

Discussion/Recommendations: Coho return timing continues to be a concern with respect to its overlap with returning fall chinook. Since we cannot allow a fishery to occur on fall chinook until the run has been rebuilt, any coho returning simultaneously with fall chinook cannot be harvested. We have attempted to reduce the overlap by using later-timed Quinalt coho when supplementation was necessary and by using only Makah coho that return after October 15 for broodstock.

We were somewhat surprised that any adult coho returned to Makah this year because the 1987 brood had been destroyed. Since no tags were recovered in

the 65 adults that did return, we assume that they are a result of hatchery escapement prior to tagging and later destruction or naturally produced fish from the Sooes River. Also, more than 1,000 two-year-old males returned, indicating a promising return for 1991.

#### CHUM

Since all broodyear 1988 progeny were destroyed as required to control spread of VHS and no replacement stock was found, the run rebuilding process will be slowed.

Releases: The hatchery released no chum this year.

Terminal Area Returns, 1990: Only two male chum returned this year.

Discussion/Recommendations: The status of the Makah NFH chum program has been discussed by the Makah Steering Committee. Outside stocks have been considered for supplemental use. However, nearby stocks are depressed and use of Nitinat stock (Canada) or Quilcene stock is precluded by harvest management concerns regarding impact on the genetic stock identification program. With no other stock available, two courses of action had been considered, including release at a larger size and a proposed release from a tribal net pen in Neah Bay. It was hoped that by releasing chum from a net pen at a larger size, survival would be increased thereby providing broodstock. However, it now appears that the program will be maintained at the NFH at whatever level can be maintained with existing returns.

#### WINTER STEELHEAD

Although broodyear 1988 subyearlings and broodyear 1989 eggs and fry were destroyed because of VHS, replacement stock for broodyear 1989 was secured from Quinault NFH.

Releases and Transfers: The hatchery released 83,629 yearlings at 6.7/lb on April 26, 1991 and 48,700 subyearlings at 502.1/lb on May 8, 1991. Also 18,000 yearlings were transferred to Educket Hatchery for imprint and release and 24,000 subyearlings at 500.0/lb were planted into the Waatch River on May 17, 1991 (Table 5).

Terminal Area Returns, 1990: A total of 81 steelhead returned to the hatchery between December 12, 1990 and February 13, 1991. Bio-sampling was performed to determine age structure and wild composition of the run (Table 7). All of the steelhead trapped during this period were of hatchery origin based on mark identification and scale analysis and 79.0% were age four.

A very limited river set net fishery operated in the Sooes River after it appeared the hatchery would meet its production requirements from returning fish. However, this fishery only harvested 32 steelhead from late December 1990 to early February 1991 when it was closed.

The weir/ladder was operated until April 16, 1991. However, no more fish returned.

Mark Recoveries: All returning fish were sampled at the hatchery for adipose marks. All but one were marked.

Discussion/Recommendations: Our goal with the steelhead program is to maintain temporal separation between hatchery and wild stocks. This will allow river net fisheries to target on hatchery fish and allow the wild run to maintain itself without competition and genetic dilution from hatchery stock. To achieve this, we have in the past assumed that hatchery fish return before February 1 and secured our broodstock before then. Fish returning after that date were assumed to be wild and allowed to pass upstream. During 1987-88, we reviewed past age data and weir operation dates and continued bio-sampling through February 1988. Based on this information, it appeared that hatchery steelhead return until late February (Zajac, 1988). Operation of the weir because of the VHS problem has allowed additional opportunities to examine a potential wild/hatchery stock separation date. Few wild fish enter the system until late February. We recommend that we continue to provide stock separation using a March first separation date to allow maximum protection to the wild stock and to secure eggs from December through January for the hatchery program.

Since VHS was not found after 1989 and wild steelhead preservation is considered a priority program at Makah, the Steering Committee agreed to resume upstream passage of the wild stock. This practice had been discontinued due to VHS precautionary measures.

Adipose clipping of yearling steelhead will continue to determine return rates and further evaluate the hatchery/wild separation date.

#### QUINULT NATIONAL FISH HATCHERY

The funding base for Quinault NFH was changed from U.S. Fish and Wildlife Service to Bureau of Indian Affairs in fiscal year 1985. A Memorandum of Agreement was developed whereby the lead programming and hatchery evaluation responsibility, previously performed by the Service, would be accomplished by the Quinault Tribe. Consequently, Service participation in this area has been greatly reduced. However, this arrangement was reversed in 1988 and our involvement in programming and evaluation has increased dramatically. Also, a technical group has been established to guide the Quinault program and develop recommendations for policy people to consider.

#### FALL CHINOOK

Releases and Transfers: Hatchery personnel released 634,577 subyearlings on July 15, at 63.3 fish/pound (Table 8) and transferred 175,545 fingerlings to the Salmon River facility. The transfer is a cooperative program with the Quinault Tribe using Salmon River stock. An additional 397,374 eggs were transferred to Quinault Lake to supplement their program (Table 9). A portion of the on-station release is coded wire tagged as a Pacific Salmon Treaty

transfer indicator stock. Specific tagging information is presented in Appendix E.

Terminal Area Returns, 1990: A total of 199 males and 377 females were handled at the hatchery. These numbers include both returns to the hatchery and adults captured in the Quinault River. Biosampling was performed on 92.5% of the fish with age five 5 being the predominant class (Table 10). Insufficient voluntary adult returns to the hatchery continue to be a problem. Also, an estimated 1,693 Quinault NFH chinook contributed to the Quinault River net fisheries (Del Boyer pers. comm.).

Coded wire Tag Recoveries: All fish were sampled for coded wire tags resulting in 123 tags representing six codes. Two of these tags originated from Quinault Lake releases. These recoveries may have been fish broodstocked from the main river. Quinault fall chinook were also caught in Alaska troll and net, Canadian troll and net, and Washington sport fisheries.

Discussion/Recommendations: Adult pond mortality continues to be a problem with female fall chinook. Nearly 20% died before spawning. The broodstock capture effort may be the primary cause. During the 1992 return, the "swim in" fish will be tagged with visible implant tags so that pond mortality rates can be compared and perhaps corrected.

In May, the Service proposed an increase in chinook production to 700,000. The tribe felt that the current level of 600,000 was sufficient (Scott Chitwood, pers. comm.). Consequently no change was made.

The current smolt production is tagged as a Treaty indicator stock which provides survival and distribution information useful for hatchery evaluation as well. No other studies are currently planned.

The Salmon River fall chinook were cooperatively tagged with the WWFRO tagging unit prior to their transfer.

#### COHO

Releases and Transfers: On April 15, 592,758 yearlings were released at 13.0 fish/pound. Also, 779,159 fingerlings were planted into reservation streams between April 11 and July 22 (Table 8). A portion of the on-station yearling release is coded wire tagged to update our knowledge of distribution and survival. Specific tagging information is presented in Appendix E.

Terminal Area Returns, 1990: Escapement to the hatchery was 956 males, 1,620 females, and 2,790 jacks. Also, an estimated 4,108 Quinault NFH coho contributed to the Quinault River net fisheries (Del Boyer pers. comm.).

Coded Wire Tag Recoveries: All returning fish were sampled for coded wire tags. Five hundred and twenty-two were recovered representing three codes. One tag originated from a wild Shale Creek coho (Queets system) and the rest from on-station releases. Quinault coho were also recovered in Alaska troll, Canadian troll and net, Washington troll, net and sport, and Oregon troll and sport fisheries.



Discussion/Recommendations: In May, the Service proposed to decrease the yearling production goal from 700,000 to 600,000. The larger number had exceeded recommended loading densities, possibly aggravating fish health problems. This reduction was approved.

No evaluations beyond the current production tagging are planned in the short term.

#### CHUM

Releases and transfers: On April 25, 995,567 fry were released at 344.2 fish/pound (Table 8). Also, 83,488 eggs were transferred to Quinault Lake to supplement their program (Table 9).

Terminal Area Returns, 1990: Seven hundred ninety-four males and 748 females returned to the hatchery. Biosampling was conducted on 19.7% of the return. Scale analysis showed age four predominated (Table 11).

Discussion/Recommendations: The Service proposed to decrease the production goal from three million to one and one-half million. This reduction more closely relates to rearing capacity than the previous figure. The proposed reduction was approved.

#### WINTER STEELHEAD

Releases and Transfers: On May 2, 175,463 yearlings were released at 5.9 fish/pound. On May 10, 40,323 yearlings were planted into the Hoh River (Table 8). Also, 50,894 pre-smolts were transferred to Chalaat Creek, 142,443 pre-smolts to Salmon River Pond, and 190,526 fingerlings to Wishkah Pond (Table 9). A portion of the yearling release was coded wire tagged to update our knowledge of river fishery interception and survival. Specific tagging information is presented in Appendix E. Tagging was also done on the Hoh and Salmon River transfer groups as requested by the Hoh and Quinault Tribes.

Terminal Area Returns, 1990: Three hundred forty-five males and 308 females returned to the hatchery. Biosampling was conducted on 70.1% of the return. Scale analysis showed age four predominated (Table 12). Also, an estimated 2,035 Quinault NFH steelhead contributed to the Quinault River net fisheries (Del Boyer pers. comm.).

Coded Wire Tag Recoveries: All returning hatchery fish were sampled for coded wire tags. Eighty-four tags were recovered representing 12 codes. Twenty of the recoveries were fish originating from Chalaat Creek and Salmon River transfers and Hoh River releases.

Discussion/Recommendations: The production goal has been discussed by the technical group and is appropriate.

No evaluation beyond the current production tagging is planned in the short term.

## ACKNOWLEDGEMENTS

Much of the data required for hatchery evaluation, programming, and coordination is collected solely by hatchery staff. That which is not, is collected cooperatively by Western Washington Fishery Resource Office (WWFRO) staff. Also, many suggested program changes and evaluation ideas originate from hatchery personnel. Makah, Quinault, and Quilcene hatchery staff have contributed significantly to the current success and future direction of the hatcheries through their innovative ideas and continuing cooperation with WWFRO. I thank the staff at Makah, Quinault, and Quilcene hatcheries for their continued support and look forward to working with them each year. I also appreciate the cooperation received from the Olympia Fish Health Center.

## REFERENCES

- Hiss, J.M, D.P. Zajac and E.E. Knudsen. 1988. The spring chinook program at Quilcene National Fish Hatchery, 1981-1987, and projection of catch and escapement to the year 2010. U.S. Fish and Wildlife Service, Fisheries Assistance Office, Olympia, Washington.
- Kane, T.R. 1992., An evaluation of the Quilcene National Fish Hatchery spring chinook salmon restoration program. U.S. Fish and Wildlife Service, Western Washington Fishery Resource Office, Olympia, Washington.
- Point No Point Treaty Council, U.S. Fish and Wildlife Service, and Washington Department of Fisheries. 1989. Hood Canal production evaluation program memorandum of understanding. Point No Point Treaty Council, Kingston, Washington.
- U.S. Fish and Wildlife Service. 1991. Fisheries resources evaluation database users' manual. Western Washington Fishery Resource Office, Olympia, Washington.
- Zajac, D.P. 1988. Plan to minimize the impact of the Makah NFH steelhead program on the Sooes River wild steelhead run. U.S. Fish and Wildlife Service, Fisheries Assistance Office, Olympia, Washington.

Table 1. Quilcene National Fish Hatchery salmon releases made into Washington waters during 1991.

Species	Stock	Brood year	Release location	Date	Number	Size (no/lb)	Weight (lbs)
Spring Chinook	Quilcene NFH	89	Big Quilcene R.	5/13/91	67,134	10.0	6,713
	Soleduck WDF	89	Big Quilcene R.	5/13/91	161,945	8.0	20,243
Coho	Quilcene NFH	89	Big Quilcene R.	5/13/91	352,556	15.0	23,504
	Quilcene NFH	90	Big Quilcene R.	2/27/91	309,250	1438.4	215
	Quilcene NFH	90	Big Quilcene R.	4/25/91	232,910	631.2	369
	Quilcene NFH	90	Big Quilcene R.	6/19/91	406,129	170.6	2,381
	Quilcene NFH	90	Big Quilcene R. (upstream of hatchery)	3/13/91	113,032	748.6	151
Chum	Quilcene NFH	90	Big Quilcene R.	5/6/91	1,314,536	709.0	1,854
	Enetai (Skokomish)	90	Big Quilcene R.	5/6/91	349,691	555.1	630

Table 2. Spring chinook age at return to Quilcene National Fish Hatchery during 1990 (98.7% sampled).

Age	Male		Female		Total number in age class
	Expanded number	Mean fork length(mm)	Expanded number	Mean fork length(mm)	
2	5	263	0	-	5
3	34	515	0	-	34
4	25	681	7	723	32
5	0	-	5	791	5
Unknown	-	-	1	-	1
Totals	64		13		77

Table 3. Counts of brood-year 1991 spring chinook (all ages) in the Big Quilcene River and hatchery. Counts in the river are based on snorkel observations.

Date	4/26	5/17	6/11	7/2	7/29
Hatchery	0	4	7	11	13
River	4	19	24	31	39
Totals	4	23	31	42	52

Table 4. Chum age at return to Quilcene National Fish Hatchery during 1990 (33.3% sampled).

Age	Male		Female		Total number in age class
	Expanded number	Mean fork length(mm)	Expanded number	Mean fork length(mm)	
3	53	608	48	609	101
4	684	713	784	665	1,468
5	25	783	0	-	25
Unknown	20	686	10	631	30
Totals	782		842		1,624

Table 5. Makah National Fish Hatchery salmon and steelhead releases made into Washington waters during 1991.

Species	Stock	Brood year	Release location	Date	Number	Size (no/lb)	Weight (lbs)
Fall Chinook	Makah NFH	90	Sooes River	5/26/91	192,500	74.0	2,601
				6/10/91	191,636	60.0	3,194
	Makah NFH	90	Sooes River (upstream of hatchery)	3/21/91	50,000	409.8	122
Coho	Makah NFH	89	Sooes River	4/16/91	305,600	13.3	22,977
	Makah NFH	90	Sooes River (upstream of hatchery)	3/6/91	250,000	1201.9	208
	Makah NFH	90	Waatch River	4/17/91	62,500	484.5	129
Winter Steelhead	Quinault NFH	90	Sooes River	4/26/91	83,629	6.7	12,482
				5/8/91	48,700	502.1	97
	Makah NFH	91	Waatch River	5/17/91	24,000	500.0	48

Table 6. Fall chinook age at return to Makah National Fish Hatchery during 1990 (98.9% sampled).

Age	Male		Female		Total number in age class
	Expanded number	Mean fork length(mm)	Expanded number	Mean fork length(mm)	
1	26	226	0	-	26
2	1	497	0	-	1
3	100	728	5	719	105
4	59	903	60	881	119
5	6	969	30	958	36
6	0	-	1	1030	1
Totals	192		96		288

Table 7. Winter steelhead age at return to Makah National Fish Hatchery during 1990 (December 12, 1990 - February 13, 1991, 98.7% sampled).

Age	<u>Hatchery</u>	<u>Wild</u>	Total number in age class
	Expanded number	Expanded number	
3	16	0	16
4	64	0	64
Unknown	<u>1</u>	<u>0</u>	<u>1</u>
Totals	81	0	81



Table 8. Quinalt National Fish Hatchery salmon and steelhead releases made into Washington waters during 1991.

Species	Stock	Brood year	Release location	Date	Number	Size (no/lb)	Weight (lbs)
Fall Chinook	Quinalt NFH	90	Cook Creek	7/15/91	634,577	63.3	10,025
Coho	Quinalt NFH	89	Cook Creek	4/15/91	592,758	13.0	45,597
	Quinalt NFH	90	Red Creek	4/11/91	80,000	272.1	294
	Quinalt NFH	90	Moclips River	6/25/91	69,427	74.7	929
	Quinalt NFH	90	Quinalt River	4/11/91 6/26/91	280,000 64,521	251.3 81.9	1,114 788
	Quinalt NFH	90	Raft River	6/25/91	95,011	107.6	883
	Quinalt NFH	90	Elk Creek	4/11/91	110,000	272.3	404
	Quinalt NFH	90	Cook Creek	7/22/91	80,200	69.6	1,152
Chum	Quinalt NFH	90	Cook Creek	4/25/91	995,567	344.2	2,892
Winter Steelhead	Quinalt NFH	90	Cook Creek	5/2/91	175,463	5.9	29,739
	Quinalt NFH	90	Hoh River	5/10/91	40,323	6.1	8,086
	Quinalt NFH	91	Quinalt River	5/31/91	225,684	1085.5	125
	Quinalt NFH	91	Cook Creek	5/24/91	28,730	2052.1	14

Table 9. Fish and eyed egg transfers from Quinalt National Fish Hatchery, 1990.

Species	Stock	Location	Date	Number	Stage
Fall Chinook	Salmon River	Salmon River Pond	7/3/90	246,509	fish
Winter Steelhead	Quinalt NFH	Chalaat Creek	2/21/90	45,920	fish
	Quinalt NFH	Salmon River Pond	3/6/90	156,063	fish
	Quinalt NFH	Wash. Dept. Wildlife	5/22/90	99,894	fish
	Quinalt NFH	Puyallup Tribe	2/26/90	104,403	eggs
	Quinalt NFH	Wash. Dept. Wildlife	2/15/90	543,117	eggs
Coho	Quinalt NFH	Makah NFH	8/7-15/90	319,200	fish

Table 10. Fall chinook age at return to Quinault National Fish Hatchery during 1990 (92.5% sampled).

Age	Male		Female		Total number in age class
	Expanded number	Mean fork length(mm)	Expanded number	Mean fork length(mm)	
2	16	463	0	-	16
3	17	665	0	-	17
4	74	860	77	887	151
5	73	964	225	964	298
6	4	1045	34	1021	38
Unknown	15	996	41	964	56
Totals	199		377		576

Table 11. Chum age at return to Quinault National Fish Hatchery during 1990  
(19.7% sampled).

Age	Male		Female		Total number in age class
	Expanded number	Mean fork length(mm)	Expanded number	Mean fork length(mm)	
3	42	708	35	623	77
4	734	766	709	692	1,443
Unknown	18	814	4	678	22
Totals	794		748		1,542

Table 12. Winter steelhead age at return to Quinault National Fish Hatchery during 1990 (70.1% sampled).

Age	Male		Female		Total number in age class
	Expanded number	Mean fork length(mm)	Expanded number	Mean fork length(mm)	
2	2	206	0	-	2
3	170	584	30	614	200
4	168	818	271	753	439
5	3	838	2	800	5
Unknown	2	561	5	776	7
Totals	345		308		653

Appendix A. Types of data collected at Quilcene, Makah, and Quinault National Fish Hatcheries for hatchery evaluation during the reporting period<sup>1</sup>

Hatchery	Fall chinook	Spring Chinook	Coho	Chum	Winter Steelhead
Quilcene	fish transfer	adult entry fish removal scale sample mark sampling mark recovery ind. spawning fish transfer environment marking specific release general release	adult entry fish removal mark sampling mark recovery group spawning fish transfer environment marking specific release general release	adult entry fish removal scale sample group spawning fish transfer environment specific release general release	n/a
Makah	adult entry fish removal scale sample mark sampling mark recovery group spawning fish transfer environment marking specific release general release	n/a	adult entry fish removal mark sampling mark recovery group spawning fish transfer environment marking specific release general release	adult entry fish removal scale sample group spawning fish transfer environment specific release general release	adult entry fish removal scale sample mark sampling mark recovery group spawning fish transfer environment specific release general release
Quinault	fish removal scale sample mark sampling mark recovery group spawning	n/a	fish removal mark sampling mark recovery group spawning fish transfer	fish removal scale sample group spawning fish transfer environment	fish removal scale sample mark sampling mark recovery group spawning

<sup>1</sup> See FRED Manual for variables included in the data types presented.

Appendix A. Types of data collected at Quilcene, Makah, and Quinalt National Fish Hatcheries for hatchery evaluation during the reporting period <sup>2</sup> (con't)

Hatchery	Fall chinook	Spring Chinook	Coho	Chum	Winter Steelhead
	fish transfer environment marking specific release general release		environment marking specific release general release	specific release general release	fish transfer environment marking specific release general release

<sup>2</sup> See FRED Manual for variables included in the data types presented.

Appendix B. Production goals for Makah, Quilcene, and Quinalt National Fish Hatcheries at beginning of reporting period. Brood year 1990.

Hatchery	Species	Goal	Size (No/lb)	Release or Transfer Location	Date
Makah	Chum	3,000,000	550	Makah NFH	May, 1991
	Coho	250,000	18	Makah NFH	May, 1992
		50,000	18	Educket Creek Pond	April, 1992
		309,000	750	Sooes River	February, 1991
		69,900	750	Waatch River	February, 1991
	Fall Chinook	4,000,000	75	Makah NFH	May, 1991
		120,695	300	Sooes River	April, 1991
	Winter Steelhead	82,000	7	Makah NFH	May, 1992
		18,000	7	Educket Creek Pond	May, 1992
Quilcene		25,500	500	Waatch River	April, 1991
	Chum	2,200,000	550	Quilcene NFH	May, 1991
	Coho	250,000	18	Quilcene NFH	May, 1992
		250,000	500	Area 12A Streams	April, 1991
		100,000	eggs	Bangor	December, 1990
		40,000	eggs	Chimacum High School	December, 1990



Appendix B. Production goals for Makah, Quilcene, and Quinalt National Fish Hatcheries at beginning of reporting period. Brood year 1990 (con't).

Hatchery	Species	Goal	Size (No/lb)	Release or Transfer	
				Location	Date
Quilcene	Spring Chinook <sup>1</sup>	200,000	5	Quilcene NFH	May, 1992
Quinalt	Chum	3,000,000	550	Quinalt NFH	April, 1991
	Coho	720,000	18	Quinalt NFH	May, 1992
		500,000	600	Reservation Streams	May, 1991
	Fall Chinook	600,000	40	Quinalt NFH	July, 1991
		250,000	100	Salmon River Pond	June, 1991
	Winter Steelhead	160,000	6	Quinalt NFH	May, 1992
		50,000	6	Hoh River	May, 1992
		50,000	15	Chalaat Creek Pond	February, 1992
		150,000	15	Salmon River Pond	February, 1992
		225,000	200	Wishkah Pond	June, 1991
		500,000	200	Reservation Streams	May, 1991

<sup>1</sup> From the Hood Canal Production Evaluation Program.

Appendix C. Information related to tag groups released from Quilcene National Fish Hatchery.

Tagging information		Quilcene spring chinook		Quilcene coho
Purpose	indicator stock antibiotic test HCPEP & release size	indicator stock antibiotic test HCPEP & release size	indicator stock antibiotic test HCPEP & release size	hatchery evaluation, HCPEP
Project length	on-going	on-going	on-going	on-going
Year of project	n/a	n/a	n/a	n/a
Brood year	1989	1989	1989	1989
Tag code	5-24-5 5-24-6 5-24-7 5-24-8 5-24-9 5-24-10 5-24-11	5-23-57 5-23-58 5-23-59 5-23-60 5-23-61 5-23-62 5-23-63	5-24-48 5-24-49	5-24-51 5-24-52 5-24-53
Tag date	May 1990	May 1990, Oct. 1990	November 1990	
Stock	Quilcene NFH	Soleduck WDF	Quilcene NFH	
Size at tagging	125/lb	100/lb	30/lb	

Appendix C. Information related to tag groups released from Quilcene National Fish Hatchery (con't.).

Tagging information		Quilcene spring chinook		Quilcene coho
Release location	Big Quilcene River	Big Quilcene River	Big Quilcene River	
Release date	May 13, 1991	May 13, 1991	May 13, 1991	
Size at release	10.0/lb	8.0/lb	15.0/lb	
Number marked released	9,318; 8,508; 9,761; 9,235; 8,996; 9,462; 11,854	18,276; 18,603; 18,961; 18,473; 18,033; 17,610; 18,547; 15,201; 16,241	25,034; 25,825; 24,886	
Tag retention rate (%)	98.9; 98.9; 96.4; 96.4; 95.3; 95.3; 97.2	95.8; 92.7; 98.5; 99.0; 98.9; 99.1; 98.5; 99.7; 100.0	84.7; 84.0; 89.1	
Number unmarked released	0	0	14,014; 13,181; 14,754	
Percent marked at release	100.0	100.0	64.1; 66.2; 62.8	

Appendix D. Information related to tag groups released from Makah National Fish Hatchery.

Tagging information	Makah fall chinook	Makah coho
Purpose	indicator stock	hatchery evaluation
Project length	on-going	on-going
Year of project	n/a	n/a
Brood year	1990	1989
Tag code	5-23-54; 5-23-53; 5-23-55; 5-23-56	5-25-05; 5-25-06; 5-25-07
Tag date	May 1990	November 1990
Stock	Makah NFH	Makah NFH
Size at tagging	130/lb	23/lb
Release location	Scoos River	Scoos River
Release date	May 26, 1991; June 10, 1991	April 16, 1991
Size at release	74.0/lb; 60.0/lb	13.3/lb
Number marked released	49,284; 52,700 51,376; 50,332	26,625; 26,469; 25,716
Tag retention rate (%)	82.6; 79.5 89.6; 89.1	99.7; 99.3; 99.3
Number unmarked released	90,496; 89,928	226,790
Percent marked at release	53.0; 53.1	25.8

Appendix E. Information related to tag groups released from Quinault National Fish Hatchery.

Tagging information	Quinault fall chinook
Purpose	indicator stock
Project length	on-going
Year of project	n/a
Brood year	1990
Tag code	21-20-16
Tag date	June 1991
Stock	Quinault River
Size at tagging	125/lb
Release location	Cook Creek
Release date	July 15, 1991
Size at release	63.3/lb
Number marked released	203,534
Tag retention rate (%)	94.9
Number unmarked released	431,043
Percent marked at release	32.1

Appendix E. Information related to tag groups released from Quinault National Fish Hatchery (con't).

Tagging information	Quinault Coho	Quinault steelhead
Purpose	Hatchery evaluation	hatchery evaluation
Project length	on-going	on-going
Year of project	n/a	n/a
Brood year	1989	1990
Tag code	21-18-57	5-24-12; 5-24-13
Tag date	November 1990	December 1990
Stock	Quinault NFH	Quinault NFH
Size at tagging	30/lb	15/lb
Release location	Cook Creek	Cook Creek
Release date	April 15, 1991	May 2, 1991
Size at release	13.0/lb	5.9/lb
Number marked released	79,193	8,834; 9,318
Tag retention rate (%)	99.3	97.7; 97.7
Number unmarked released	513,565	157,311
Percent marked at release	13.4	10.3